Claims

1. A method of determining a bit error rate in a communication system comprising a transmitter, a medium, and a receiver, the method comprising:

identifying a plurality of causes of bit errors;

measuring the communication system to determine probability density functions, each of which corresponds to one of the plurality of causes of bit errors;

integrating each of the corresponding probability density functions over an interval representing a range in which the corresponding cause creates a bit error, thereby generating a plurality of integrated quantities; and

summing the integrated quantities to arrive at a bit error rate for the communication system.

2. The method of claim 1, wherein the plurality of causes includes a waveform edge transition being tardy.

3. The method of claim 1, wherein the plurality of causes includes a waveform edge transition being premature.

4. The method of claim 1, wherein the plurality of causes includes excessive waveform amplitude.

5. The method of claim 1, wherein the plurality of causes includes insufficient waveform amplitude.

6. The method of claim 1, further comprising:

integrating each of the probability density functions over various intervals, thereby creating a plurality of ordered pairs.

7. The method of claim 6, further comprising:

representing the ordered pairs on a display, to present a surface depicting the bit error rate as a function of the plurality of causes of bit errors.

8. The method of claim 1, wherein measuring the communication system to determine a corresponding probability density function includes the step of fitting a portion of a partially measured probability density function to a known function to arrive at a complete probability density function.

9. The method of claim 8, wherein the known function is a gaussian function.

10. The method of claim 8, wherein the portion of the partially measured probability density function is a tail portion.

11. The method of claim 1, wherein measuring the communication system to determine a corresponding probability density function includes the step of fitting a portion of a partially measured cumulative distribution function to a known function to arrive at a complete cumulative distribution function.

12. The method of claim 11, wherein the known function is an error function.

13. The method of claim 11, wherein the portion of the partially measured cumulative distribution function is a tail portion.

14. The method of claim 1, wherein measuring the communication system to determine a corresponding probability density function includes measuring the system to arrive at a cumulative distribution function, and taking the derivative of the measured cumulative distribution function to arrive at the corresponding probability density function.

15. An apparatus for determining a bit error rate in a communication system, the apparatus comprising:

(a) a measurement apparatus for measuring the communication system to determine probability density functions corresponding to a plurality of causes of bit errors; and

(b) an analyzing unit, operatively connected to the measurement apparatus, for integrating each of the probability density functions over an interval representing a range in which the corresponding cause creates a bit error, thereby generating a plurality of integrated quantities, and summing the integrated quantities to arrive at a bit error rate for the communication system.

16. The apparatus of claim 15, wherein the measurement apparatus measures occurrences of waveform edges transition being tardy.

17. The apparatus of claim 15, wherein the measurement apparatus measures occurrences of waveform edges transition being premature.

18. The apparatus of claim 15, wherein the measurement apparatus measures occurrences of excessive waveform amplitude.

19. The apparatus of claim 15, wherein the measurement apparatus measures occurrences of insufficient waveform amplitude.

20. The apparatus of claim 15, wherein the analyzing unit is further configured and arranged to integrate each of the probability density functions over various intervals, thereby creating a plurality of ordered pairs.

21. The apparatus of claim 20, wherein the analyzing unit is further configured and arranged to represent the ordered pairs on a display, to present a surface depicting the bit error rate as a function of the plurality of causes of bit errors.

22. The apparatus of claim 15, wherein the analyzing unit is further configured and arranged to fit a portion of a partially measured probability density function to a known function to arrive at a complete probability density function.

23. The apparatus of claim 22, wherein the known function is a gaussian function.

24. The apparatus of claim 22, wherein the portion of the partially measured probability density function is a tail portion.

25. The apparatus of claim 15, wherein the analyzing unit is further configured and arranged to fit a tail portion of a partially measured cumulative distribution function to a known function to arrive at a complete cumulative distribution function.

26. The apparatus of claim 25, wherein the known function is an error function.

27. The apparatus of claim 25, wherein the portion of the partially measured cumulative distribution function is a tail portion.

28. The apparatus of claim 15, wherein the analyzing unit is further configured and arranged to take the derivative of a measured cumulative density function to arrive at a probability density function.

29. An article of manufacture comprising a program storage medium readable by a computer having a memory, the medium tangibly embodying one or more programs of instructions executable by the computer to perform method steps for performing operations to arrive at a bit error rate for a communication system, the method comprising the steps of:

for each of a plurality of causes of bit errors, measuring the communication system to determine a corresponding probability density function;

integrating each of the corresponding probability density functions over an interval representing a range in which the corresponding cause creates a bit error, thereby generating a plurality of integrated quantities; and

summing the integrated quantities to arrive at a bit error rate for the communication system.

30. The article of manufacture of claim 29, wherein the plurality of causes of bit error rates includes amplitude jitter and timing jitter.

31. A method of determining a bit error rate in a hypothetical communication system, the method comprising:

identifying a plurality of causes of bit errors;

obtaining probability density functions, each of which corresponds to one of the plurality of causes of bit errors;

integrating each of the corresponding probability density functions over an interval representing a range in which the corresponding cause creates a bit error, thereby generating a plurality of integrated quantities; and

summing the integrated quantities to arrive at a bit error rate for the communication system.

32. A method of determining a bit error rate in a communication system, the method comprising:

identifying a plurality of causes of bit errors;

obtaining cumulative distribution functions, each of which corresponds to one of the plurality of causes of bit errors;

obtaining probability values from the cumulative distribution functions, the probability values corresponding to degrees of corresponding causes sufficient to create a bit error; and

summing the probability values to arrive at a bit error rate for the communication system.

33. A method of determining a bit error rate in a hypothetical communication system, the method comprising:

identifying a plurality of causes of bit errors;

obtaining cumulative distribution functions, each of which corresponds to one of the plurality of causes of bit errors;

obtaining probability values from the cumulative distribution functions, the probability values corresponding to degrees of corresponding causes sufficient to create a bit error; and

summing the probability values to arrive at a bit error rate for the communication system.